REMARKS

In the Office Action, the Examiner noted different interpretation queiries. For expediency, applicants are using the Examiner's interpretations. However, the actual interpretation may be broader or narrower based on the specification and claim context.

The Examiner noted open loop verses closed loop operation and questioned alternative uses. The specification treats these options as useable separately or together. Accordingly, the figures show both for the sake of description. The description clearly indicates the use as separate and together. No correction of the drawings is needed.

The Examiner objected to the lack of clarity regarding velocity verses velocity parameter. Without narrowing the claims, applicants have amended velocity in several claims to velocity parameter. As noted by the Examiner, one velocity parameter is velocity.

Claims 1-7, 11, 20-22, and 24 were rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over the combined teachings of Mochizuki, et al. (U.S. Patent No. 5,152,294) and Shimizu (U.S. Patent No. 4,579,122). Claims 8-10, and 14-18 were rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over the combined teachings of Mochizuki, et al. and Shimizu, and further in view of Dunham (U.S. Patent No. 6,080,108). Claim 23 was rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over the combined teachings of Mochizuki, et al. and Shimizu, further in view of Dunham, and further in view of Verdonk, et al. (U.S. Patent No. 5,485,845). Claims 12-13 and 19 were objected to as allowable if amended into independent form. Applicants respectfully request reconsideration of the rejections of claims 1, 3-11, 14-18, and 20-24, including independent claims 1, 12, 13, 14, and 20.

Independent claim 1 has been amended to include the limitations of claim 2. In particular, claim 1 recites wherein determining velocity parameters of a mechanically rocked array at different positions comprises storing an array velocity parameter profile having the velocity parameters for various scan plane positions throughout the volume scan, the various scan plane positions including the first and second positions. As noted by the Examiner, Mochizuki use angle sensing for a rocked array. Instead, the Examiner relies on Shimizu for the use of velocity parameters.

Shimizu does not disclose the velocity parameter information as claimed in claim 1. Shimizu rotate the rocking motor at an inconsistent velocity so that the scanning velocity becomes constant (col. 2, lines 24-26). A rotation detector outputs to a motor driver for control of rotation velocity (col. 3, lines 16-19). The rotation angular velocity is changed in accordance with the rotation angle or position (col. 3, line 64-col. 4, line 4). A rotation angle is supplied to the motor driver, and the motor driver calculates the velocity (col. 6, lines 49-55; and col. 7, lines 44-53). In one example, an inconstant motor velocity function corresponding to a detection value of the rotation angle is read out from a table to control the motor (col. 8, lines 41-44). In particular, the dummy angle is read out from a table, so the motor driver may control the motor (col. 8, lines 45-60). Shimizu control velocity of the motor by storing a table of angles and functions. A velocity function may be read out, but Shimizu do not store an array velocity parameter profile having velocity parameters for various scan plane positions.

Independent claim 11 recites setting a spatial relationship of previously acquired data as a function of the velocity parameters. Shimizu and Mochizuki disclose acquiring data at a desired position, not setting a spatial relationship of previously acquired data.

Independent claims 12 and 13 are allowable given the Examiner's indication of allowability if amended to include the limitations of the base claim 1.

Independent claim 14 recites a beamformer operable to set first and second scan positions as a function of first and second different velocity parameters, respectively, of a mechanically rocked array. The Examiner relies on beamformer or control of transmit portions to achieve scan position regularity of Dunham in combination with the combined teachings of Mochizuki, et al., and Shimizu. A person of ordinary skill in the art would not have used the beamformer control of transmit portions to achieve scan position regularity of Dunham with Shimizu. Shimizu controls motor velocity to achieve scan position. Shimizu do not use but disclose beamformer control to change scan position (col. 1, lines 56-60). Shimizu teach away from such beamformer control due to depth of scan concerns (col. 1, lines 56-60). Accordingly, a person of ordinary skill in the art would not have used the beamformer control of transmit portion to achieve scan position regularity of Dunham with Shimizu.

Independent claim 20 recites determining a velocity parameter for each of a plurality of scan positions, and starting each of a plurality of scans as a function of the respective velocity parameters and scan positions. Shimizu control the motor velocity to scan at the desired position. Shimizu do not need to determine the velocity parameter and start each scan as a function of the velocity parameter and scan position. The position determines the velocity for Shimizu, so the start of each scan is not a function of the velocity parameters and the scan positions.

The dependent claims depend from an independent claim, so are allowable for the same reasons. Further limitations distinguish from the cited references. For example, claims 3 and 16 recite different velocity profiles for forward and reverse directions. Mochizuki, et al. and Shimizu do not suggest different profiles for forward and reverse directions. Claim 5 recites predicting velocity profile form a programmed motor speed, but Shimizu controls motor speed to provide velocity profile. Claims 9 and 24 recite setting to provide base scan line position at a same position in forward and reverse directions. Shimizu does not suggest setting to provide this alignment. Claim 21 recites determining from a stored velocity profile, but Shimizu stores the velocity function to determine velocity from position.

Claim 23 is allowable since a person of ordinary skill in the art would not have used the scan start time adjustment of Verdonk, et al. with Mochizuki, et al., Shimizu and Dunham. Verdonk et al. relates to a single element rotating transducer, but the other references relate to rocking arrays. Verdonk, et al. relates to catheter based scanning, but the other references relate to patient external rocking arrays.

Claim 23 is also allowable since Verdonk, et al. do not provide the claim limitations missing from the other references. Verdonk, et al. adjust the position of firing each single transmission. The position of relative transmissions is adjusted. Verdonk, et al. do not suggest starting planar scans earlier as a function of velocity.

New claim 25 recites electronically setting frame trigger positions as a function of the first and second velocity parameters, respectively. The cited references do not suggest this limitation.

CONCLUSION:

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call the undersigned at (650) 943-7554 or Craig Summerfield at (312) 321-4726.

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